09/751581 1-23-06 cpc

Docket No.: 08212/000S104-US0
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Letters Patent of:
Brana Kukic

Patent No.: 6,963,533

Issued: November 8, 2005

For: METHOD AND SYSTEM FOR ESTABLISHING LINK BIT RATE FOR INVERSE MULTIPLEXED DATA STREAMS

Certificate
JAN 25 2006
of Correction

REQUEST FOR CERTIFICATE OF CORRECTION
PURSUANT TO 37 CFR 1.322

Attention: Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Upon reviewing the above-identified patent, Patentee noted several Patent office errors which should be corrected.

In the Figures:

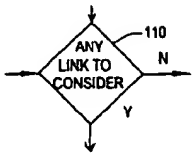
Sheet 2 of 2 (Fig. 2), Block 102, After "INITIAL" delete "SYCRONIZATION" and insert --SYNCHRONIZATION --.

Sheet 2 of 2 (Fig.2), Block 104, Delete "OBTAIM" and insert -- OBTAIN --.

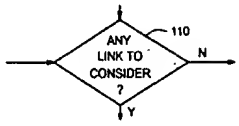
JAN 26 2006

Sheet 2 of 2 (Fig.2), Block 110,

Delete "



" and



insert - - - -.

Sheet 2 of 2 (Fig. 2), Block 114, Line 1, After "LAST" delete "MIN RATE" and insert

-- MIN-RATE --.

Sheet 2 of 2 (Fig. 2), Block 114, Line 3, Below "FOUND" delete "MIN RATE" and insert -- MAX RATE --.

Sheet 2 of 2 (Fig. 2), Block 118, Line 2, After "OF" delete "RATE" and insert

-- RATES --.

Sheet 2 of 2 (Fig. 2), Block 120, Line 2, After "RATE" insert -->--.

Sheet 2 of 2 (Fig. 2), Block 120, Line 4, Below "TOTAL" insert --?--.

Sheet 2 of 2 (FIG. 2), Block 120, Line 3, Delete "NEW TOTAL" and insert

-- "NEW TOTAL"--.

In the Specification:

Column 1, Line 19 (Approx.), After "stream" insert --.--.

Column 3, Line 12 (Approx.), Delete "re" and insert -- are --.

Column 3, Line 17 (Approx.), Delete "**DSI**" and insert -- DS1--.

Column 3, Line 18 (Approx.), Delete "**DSI**" and insert -- DS1--.

Column 3, Line 18 (Approx.) Delete "tream" and insert --stream--.

Column 3, Line 23 (Approx.) Delete "such" delete "s" and insert -- as --.

Column 4, Line 31 (Approx.) Delete "carded" and insert --carried --.

Column 4, Line 48, After "28" insert --.--.

Column 5, Line 29 (Approx.) Delete "east" and insert -- least --.

Column 5, Line 30 (Approx.) Delete "describe" and insert --described--.

Column 6, Line 32, In Claim 6, after "of" insert -- the --.

Column 6, Line 35, In Claim 7, after "second" delete "to" and insert -- unit --.

Column 6, Line 57, In Claim 9, delete "an" and insert -- and --.

Column 6, Line 63, In Claim 9, after "trained" insert -- at the optimal rate --.

Column 6, Line 66, In Claim 10, delete "change" and insert -- changed --.

Column 8, Line 14, In Claim 16, delete "a" and insert --at--.

Column 8, Line 17, In Claim 17, before "failed" insert --a--.

The errors were not in the application as filed by applicant; accordingly no fee is required.

Enclosed please find copies of Figure 2 (1 page), copies of the specification (5 pages), copies of the Preliminary Amendment (5 pages), and Copies of the Claims (7 pages).

Transmitted herewith is a proposed Certificate of Correction effecting such amendment. Patentee respectfully solicits the granting of the requested Certificate of Correction.

Dated: January 20, 2006

Respectfully submitted,

By _____

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,963,533

APPLICATION NO. : 09/751,581

ISSUE DATE : November 8, 2005

INVENTOR(S) : Brana Kukic

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Figures:

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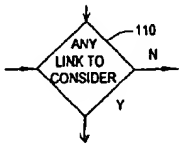
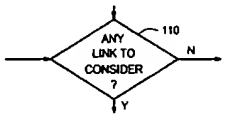


Delete " " and



insert - - - -.

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Column 4, Line 48, After "28" insert --.--.

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Column 5, Line 30 (Approx.) Delete "describe" and insert --described--.

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Column 6, Line 35, In Claim 7, after "second" delete "to" and insert -- unit --.

Column 6, Line 57, In Claim 9, delete "an" and insert -- and --.

Column 6, Line 63, In Claim 9, after "trained" insert -- at the optimal rate --.

Column 6, Line 66, In Claim 10, delete "change" and insert -- changed --.

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REPLACEMENT SHEET

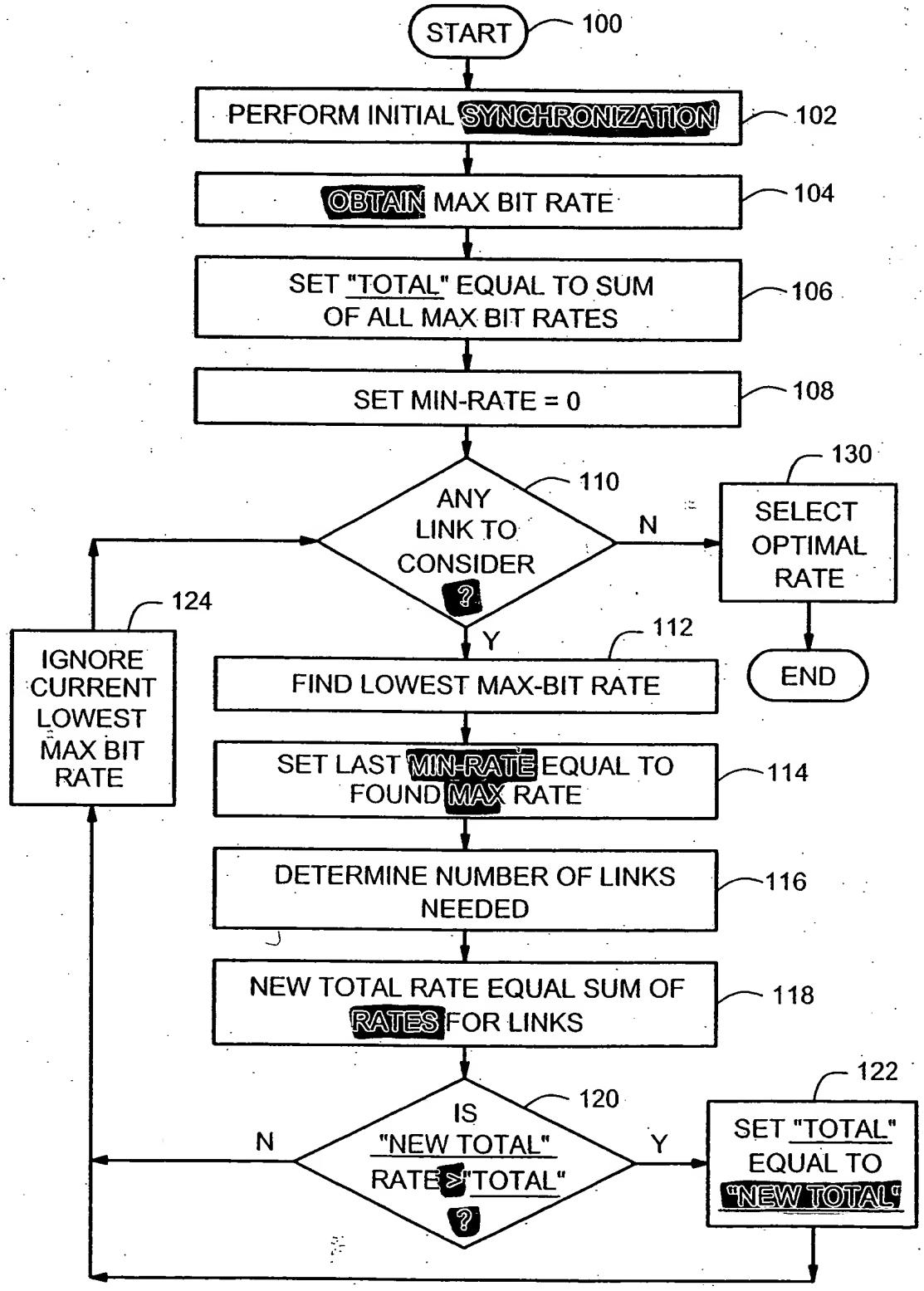


Figure 2

Attorney Docket No. NC30313
Express Mail Label No. EL664599107US

METHOD AND SYSTEM FOR ESTABLISHING LINK BIT RATE FOR INVERSE MULTIPLEXED DATA STREAMS

BACKGROUND

[0001] This invention relates to telecommunication systems, and more specifically, to inverse multiplexing data streams over multiple links.

[0002] In telecommunication networks or systems, data or a data stream is transported from one location in the network to another location in the network at various data rates. Thus, the situation may arise, at some point in the network, where the transport data rate for an incoming data stream exceeds the capacity of a single link over which the data stream needs to be transported. Known solutions to this problem teach that the data stream can be distributed or split into separate streams and the separate streams sent over multiple links or lines of lower capacity; the aggregate capacity of the lower capacity links is sufficient to carry the data stream. This approach to splitting data or transporting the data stream over several links is known as "inverse multiplexing".

[0003] Even when a high capacity link is available in the network that can handle the entire incoming data stream, the data stream may not make full use of the capacity of the single link. Thus, current standards teach that it may be preferable to inverse multiplex the data stream onto a number of lower capacity links, and thereby fully utilize the capacity of the links in the network.

[0004] In a typical network, there are various bandwidths described in terms of data stream rates or bit rates. For example, a DS1 or T1 bit stream is transmitted at a line rate of 1.544 Mbps. The terms "DS1" and "T1" are used interchangeably herein. T1 is a full-duplex system: transmitted signals are transported on one wire pair, and received signals are transported on a separate wire pair. In each direction, the 1.544 Mbps data streams are organized according to a predetermined protocol. An alternative data rate is E1. E1 bit streams are transmitted at a line rate of 2.048 Mbps.

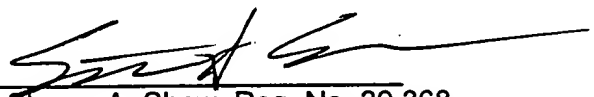
[0016] (Amended)For illustration purposes, the IMUXs 20 and 22 are shown coupled by the physical communication links 28a-*n* that are T1 or DS1 links, which carry bi-directional format data streams. Each link 28 carries data streams in either direction at a specified rate, which depends on the links characteristics. In the illustrative example, each of the links 28a-*n* carries one DS1 data stream 30a-*n* in one direction and another DS1 data stream 32a-*n* in the other direction. In discussing the capacity of each link to carry information, the term's data rate, bit rate, and bandwidth are used interchangeably to indicate capacity to carry information. In other embodiments, data streams of different rates and formats, such as a DSL on E1, may be utilized. The channel 23 is used for communication between the IMUX 20 and the IMUX 22 information related to the optimal rate prior to training of the links 28.

REMARKS

The above amendments have added no new matter to the application.

Respectfully submitted,

Date: 3/12/01



Steven A. Shaw, Reg. No. 39,368
Attorney for Applicant
972-894-6173/ Fax 972-894-5619

[0023] The process of determining and selecting the optimal transmission rate is carried out by the processor 25. Various factors are considered, including the characteristics of each link 28, in order to determine the optimal rate. The characteristics considered include attenuation, error-rate, and noise. For example, if four links between the IMUX 20 and 22 are selected, such as links 28a-d, to carry the inverse multiplexed ATM cell stream, then four links are trained at the selected optimal rate.

[0024] Referring now to Fig. 2, the process of determining the optimal rate begins at step 100. At step 102, the characteristics of each link 28a-*n* is determined and initial synchronization is performed. A predefined signal is transmitted from one IMUX, typically the master IMUX, to the other IMUX on each of the links 28. Based on the received signal characteristics, the characteristics of each link 28 can be determined using such factors as attenuation. At step 104, using the characteristics of each link 28, a maximum-bit-rate or bandwidth is determined for each link 28.

[0025] At step 106, the total bandwidth for all the links 28a-*n* are determined by adding or summing the maximum-bit-rate for each of the links 28. Additionally, the total available bandwidth is determined by setting each link 28 to operate at the lowest maximum-bit-rate selected from all of the available links and then calculating the total capacity, which is based on the selected lowest maximum-bit-rate times the number of available links 28. At step 108, a minimum-bit-rate variable is defined and set to zero. At step 110, it is determined if all links have been compared and analyzed in order to determine the optimal data rate. Typically, there will be several links to compare, unless all of links 28 coupling the IMUX 20 and the IMUX 22 are not successfully activated, and hence, unavailable.

[0026] If there are available links 28 that can be compared and analyzed, then at step 112, the maximum-bit-rates for all of the successfully activated links 28 are compared to find the link 28 with the lowest maximum-bit-rate or bandwidth. At step 114, the link 28 with the lowest value of maximum-bit-rate is found and the minimum-bit-rate is set to equal the maximum-bit-rate of that

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph 0029 with the following:

[0029] In some instances, the number of links 28 selected to participate in transporting the data stream between the IMUX may be greater than needed. Thus, there may be at least one link available to be trained at the optimal data rate and set to idle status as described in detail in available U.S. application Ser. No. [[_____]] 09/751,808 titled "PORT SWAPPING FOR INVERSE MULTIPLEXED DIGITAL SUBSCRIBER LINES" filed on [[_____]] December 29, 2000 and incorporated herein by reference.

choosing a rate from the maximum transmission rates that corresponds to one of the available links, and thus, one total available rate from the total available rates that is at least equal to or greater than the desired transmission rate to produce the optimal transmission rate.

2. (Original) The system of claim 1, wherein the characteristics of each of the links includes the maximum transmission rate for each of the links.

3. (Original) The system of claim 1, wherein a total available transmission rate is at least equal to the desired transmission rate.

4. (Original) The system of claim 3, wherein the total available transmission rate is the sum of the transmission rate of each of the links.

5. (Original) The system of claim 1, wherein the first unit receives a data stream and inverse multiplexes the data stream over at least two trained links selected from the links.

6. (Previously Presented) The system of claim 5, wherein the second unit receives and multiplexes the inverse multiplexed data stream from each of the links to produce the data stream.

7. (Original) The system of claim 6, further comprising at least one data link selected from the links that is trained and set to idle status, wherein the first unit and the second unit switch to use the idle link to replace any one of the links that has failed and wherein the status of the idle link is changed to active.

8. (Original) The system of claim 7, wherein the failed link is trained at the optimal transmission rate and set to idle status.

9. (Amended) A system for determining an optimal transmission rate for passing a cell stream from a first location to a second location at a desired transmission rate, the system comprising:

a first unit at the first location coupled to one end of each of a plurality of low capacity data links for assisting in determining characteristics of each of the links using a test signal transmitted over each of the links;

a second unit at the second location coupled to the other end of each of the links for assisting in determining the characteristics of each of the links based on the characteristic of the test signal received at the second unit; and

a processor coupled to the second unit for determining the optimal transmission rate based on the characteristics of the links and the number of links needed to provide the desired transmission rate;

wherein the first unit receives an ATM cell stream and inverse multiplexes the cell stream over the links that are trained at the optimal rate and wherein the second unit receives and multiplexes the inverse multiplexed cell stream from each of the active trained data links to produce the cell stream and wherein at least one link is trained at the optimal rate and set to idle status.

10. (Original) The system of claim 9, wherein the first unit and the second unit switch to use the idle link to replace a failed link and wherein the status of the idle data link is changed to active.

11. (Original) The system of claim 10, wherein the failed link is retrained at the optimal rate and is set to idle status.

12. (Original) A method for determining an. optimal rate for transmitting a cell stream at a desired transmission rate from a first location to a second location over a plurality of low capacity links, the method comprising:

determining characteristics and a maximum rate for each of the links to create a list of available links and associated transmission rates;

selecting the link with the lowest rate and setting all available links to transmit at the same rate to determine a total available rate;

comparing the total rate based on the lowest rate and the number of available links to the desired rate;

finding the next lowest rate from the available rates and setting all other links to transmit at the next lowest rate to determine another total available rate;

repeating the finding step until all available rates have been considered to create a list of maximum rates and corresponding total available rates; and

choosing a rate from the maximum rates that corresponds to one of the available links, and thus, one total available rate from the total available rates that is at least equal to or greater than the desired rate to produce the optimal rate.

13. (Previously Presented) The system of claim 9, wherein the characteristics of each of the links includes the maximum transmission rate for each of the links.

14. (Previously Presented) The system of claim 9, wherein a total available transmission rate is at least equal to the desired transmission rate.

15. (Previously Presented) The system of claim 14, wherein the total available transmission rate is the sum of the transmission rate of each of the links.

16. (Previously Presented) The method of claim 12, further comprising training at least one of the available links to be an idle link and setting status of the idle link to idle.

17. (Previously Presented) The method of claim 16, further comprising replacing a failed link with the replacement link, wherein the status of the idle link is changed to active.

Application No. (if known): 09/751,581 Attorney Docket No.: 08212/000S104-US0

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Lillian Garcia
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Copies of the Preliminary Amendment (5 pages)
Copies of the Claims (7 pages).
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